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Research Commentary

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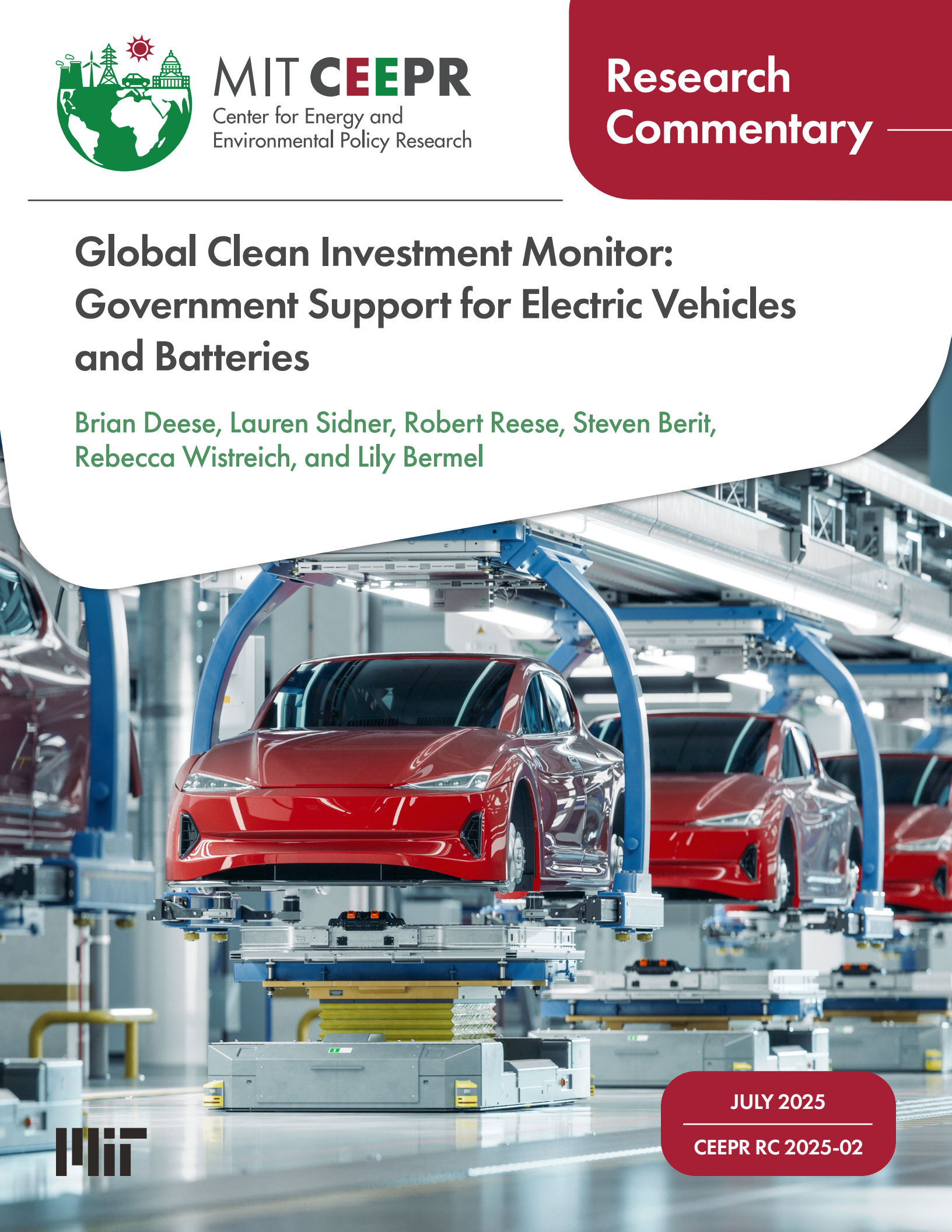
Brian Deese, Lauren Sidner, Robert Reese, Steven Berit, Rebecca Wistreich, and Lily Bermel



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RC-2025-02
Commentary

Global Clean Investment Monitor: Government Support for Electric Vehicles and Batteries

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For two years, the US Clean Investment Monitor (CIM)—a joint project of Rhodium Group and MIT's Center for Energy and Environmental Policy Research (CEEPR)—has provided a comprehensive, real-time source of information on investment in the manufacture and deployment of clean energy technologies in the United States (US). The CIM provides timely insights into the state of the US clean energy transition and the impact of relevant policy on clean energy deployment and local economic development.

Rhodium and MIT CEEPR are now developing a new Global Clean Investment Monitor (GCIM) to track global investment in the manufacturing and deployment of clean energy technologies. The GCIM will provide policymakers and investors with up-to-date information on activity in clean energy technology value chains, including data on manufacturing investments at various stages of completion, estimated annual production capacity by country, current and projected country-level demand, and public subsidies. The first phase of GCIM's development tracks investment and subsidies in the manufacturing and deployment of electric vehicles and batteries.[1]

I. Introduction

Policy and public subsidies—ranging from support for research and development, to fuel economy standards, to subsidizing electric vehicle (EV) uptake—have played important roles throughout the decades-long development and commercialization of EV and battery technologies. As those technologies have advanced, the types and amount of government support have evolved. Today, even as global EV sales have accelerated rapidly in recent years, governments continue to rely on a combination of regulatory measures, public subsidies, and trade protections to build domestic EV and battery markets.

This analysis offers first-of-a-kind comprehensive and rigorously sourced estimates of public subsidies for EVs and batteries across the world's three largest EV markets: China, Europe, and the US.[2] Coupled with Rhodium Group data

1 For purposes of this analysis, "EVs" includes battery electric vehicles and plug-in hybrid electric vehicles.

2 For purposes of this analysis, "Europe" refers to the 27 European Union member states and the United Kingdom.

on total manufacturing investment and capacity, it gives a holistic, up-to-date understanding of how EV markets are evolving and how transport-sector decarbonization is unfolding.[3]

Ongoing updates to GCIM data will support analysis on the real-world impacts of fast-changing policies.[4] US policy is shifting especially rapidly. In July 2025, the US Congress passed legislation that dramatically reduces incentives for many clean energy technologies, including wind, solar, and EVs. This analysis provides a snapshot of EV and battery subsidies and total investment leading up to those changes. Going forward, GCIM will provide up-to-date data on the effects of policy changes on investment in batteries, EVs, and other clean energy technologies in the US and other major world markets.

SCOPE OF SUBSIDIES DATA

Differing market structures, industrial strategies, and budget processes, alongside variability in data availability and granularity, complicate efforts to collect comparable subsidies data across countries. Our data collection methodology, outlined in greater detail in an appendix to this report, sought to account for these differences while maximizing accuracy and comparability.

For purposes of this analysis, subsidies include the benefits from grants, below-market loans, tax incentives, and below-market equity, defined in greater detail in the methodology appendix. Different regions rely on different subsidy instruments; we estimate the specific amount of each funding instrument that constitutes a subsidy in the context of that market to maximize the ability to compare across instruments and regions.

The data is limited to subsidies committed from 2018-2024 that specifically target the manufacture or deployment of electric vehicles (EVs) and batteries. It excludes non-targeted subsidies, subsidies for research and development activities, and below-market inputs, including land. Additionally, it does not seek to quantify the effects of disincentives to the production or purchase of internal combustion engine vehicles or other non-fiscal policies. Data for China and Europe is newly collected. US data draws from the US Clean Investment Monitor, which includes federal funding data from 2022-2024, and adds estimated funding commitments for in-scope programs from the pre-2022 period.

Additionally, US and European data excludes sub-national subsidies. European data includes funding budgeted by national governments and the European Union; US data is limited to federal government funding. While national government funding has been the main source of public support for EVs and batteries in both regions, it is important to note that about 20 US states have implemented programs to subsidize EV sales or private charging installation, and several European countries have preferential tax treatment for EVs at the local level. Those incentives are not reflected in this data. In the case of China, the reverse is true, and a substantial portion of EVs and battery subsidies is supported by local governments at various levels. As such, data for China includes the primary funding instruments for both central and sub-national government subsidies to provide a more complete picture.

3 Delgado et al. (2025). Global Clean Investment Monitor: Electric Vehicles and Batteries. *Rhodium Group*. https://rhg.com/research/global-clean-investment-monitor-electric-vehicles-and-batteries/.

4 GCIM data, including the data underlying this analysis is available through the ClimateDeck data platform: https://rhg.com/energy-climate/data-and-tools/the-climatedeck/.

II. Cross-Region Comparison: Subsidies

In the 2018-2024 period, China had an early and sizeable lead in total EV and battery subsidies. European EV and battery subsidies grew steadily from 2018-2023, nearly closing the annual gap with China in 2021. Yet, in 2022, China quickly reopened the gap, as its total subsidies grew at a faster rate than Europe's through 2022 and 2023. In 2023, when subsidies in both regions peaked, China's total subsidies exceeded Europe's by $10 billion (Table 1). The US began to scale up EV and battery subsidies later than the other two jurisdictions, following adoption of the Inflation Reduction Act (IRA) in August 2022. In 2022, Europe's subsidies exceeded US support by $16 billion, but by 2024, the gap stood at $3 billion.

	Average Annual EV and Battery Subsidy	Peak Annual EV and Battery Subsidy (Year)
China	$22.4 billion	$35.0 billion (2023)
Europe	$13.8 billion	$24.5 billion (2023)
United States	$6.1 billion	$18.8 billion (2024)

Table 1. Average and Peak Annual EV and Battery Subsidies by Region[5]

Similar patterns hold when looking at subsidies relative to gross domestic product (GDP). As a share of GDP, Chinese EV and battery subsidies outpace subsides in the US and Europe by an even larger margin. For example, as a share of GDP in 2024, EV and battery subsidies totaled 0.19 percent in China, compared to 0.10 percent in Europe and only 0.07 percent in the US (Figure 1).

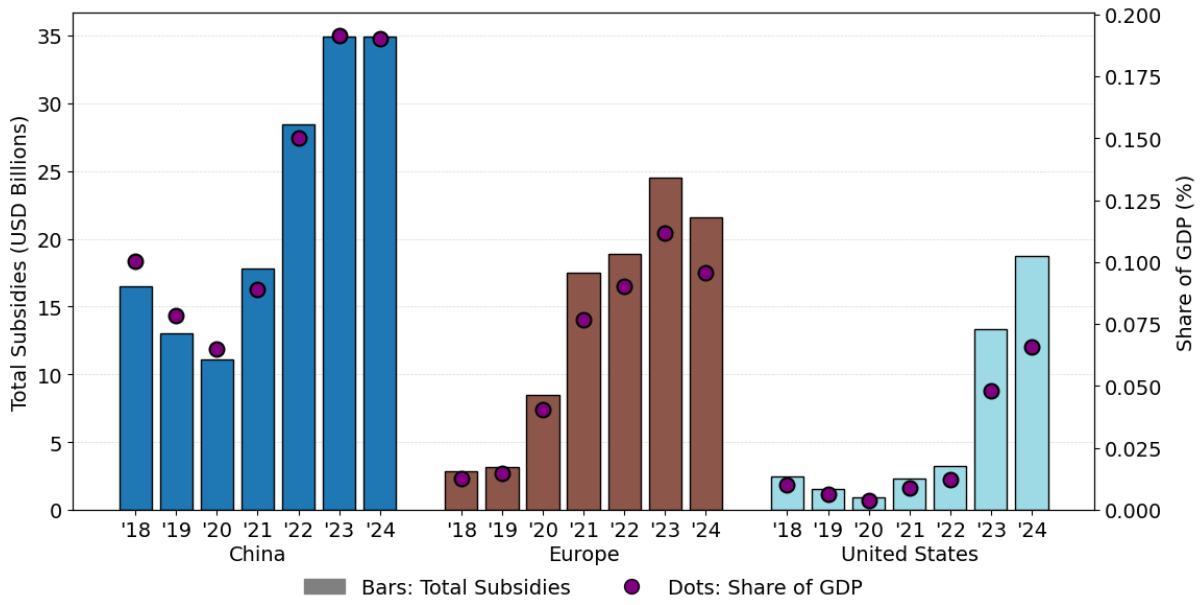

Figure 1. Total Annual EV and Battery Subsidies by Region.
Note: Europe includes the 27 EU member states and the UK. Source: Global Clean Investment Monitor, International Monetary Fund.

China has supported its EV and battery industries with a more diversified funding approach than Europe and the US. In China, benefits from below-market loans and equity play a more significant role in supporting those industries, in part, because of the state's more systematic ability to direct financial actors in the Chinese economy. Those tools, which often preferentially target domestic actors, have proven extremely valuable to Chinese firms—in rapidly scaling production and

5 All amounts are in 2023 US dollars unless otherwise specified.

in weathering periods of low revenue. As a share of its total support, China's grant-based support generally declined from 2018 to 2024, while tax incentives and below-market equity benefits grew. Over the covered timeframe, nearly half of China's subsidies were delivered as tax incentives, a quarter were in the form of below-market equity returns, and another 23 percent was issued as grants. Europe relied heavily on tax incentives and grants, while tax incentives accounted for 94 percent of US support over the 2018-2024 period.

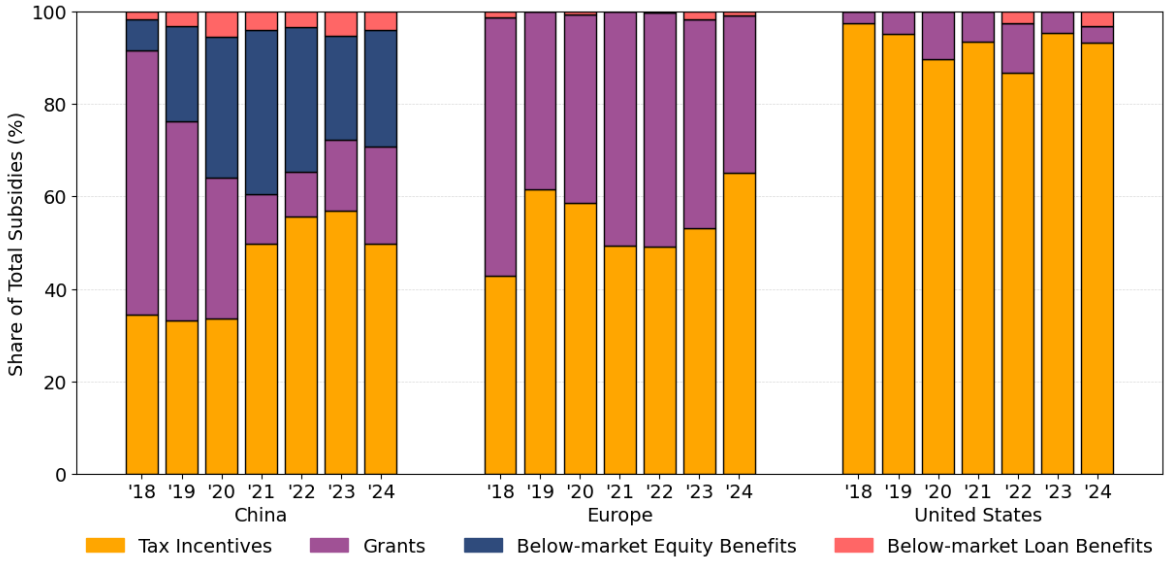

Figure 2. Share of EV and Battery Subsidies by Subsidy Instrument.
Note: Europe includes the 27 EU member states and the UK. Source: Global Clean Investment Monitor.

China maintains a considerable lead in support for manufacturing. However, the US rapidly scaled manufacturing subsidies in recent years, thereby helping to substantially close the gap with China in annual new investment flowing to EV and battery manufacturing. China dedicated 46 percent, or $72.8 billion, of all subsidies for the battery and EV sectors to manufacturing (Figure 3). Its annual manufacturing subsidies averaged $10.4 billion and grew rapidly since 2018. By contrast, the US began scaling manufacturing subsidies only in 2022 but has done so rapidly since then. The US provided a total of $13.0 billion in subsidies from 2022-2024, primarily for battery manufacturing, and in 2023 and 2024—when companies could claim the advanced manufacturing tax credit—US manufacturing subsidies averaged $6.5 billion per year. In 2024, total investment in EV and battery manufacturing in China fell sharply, and in the US, total manufacturing investment grew with subsidies and surpassed total manufacturing investment in China for the first time.

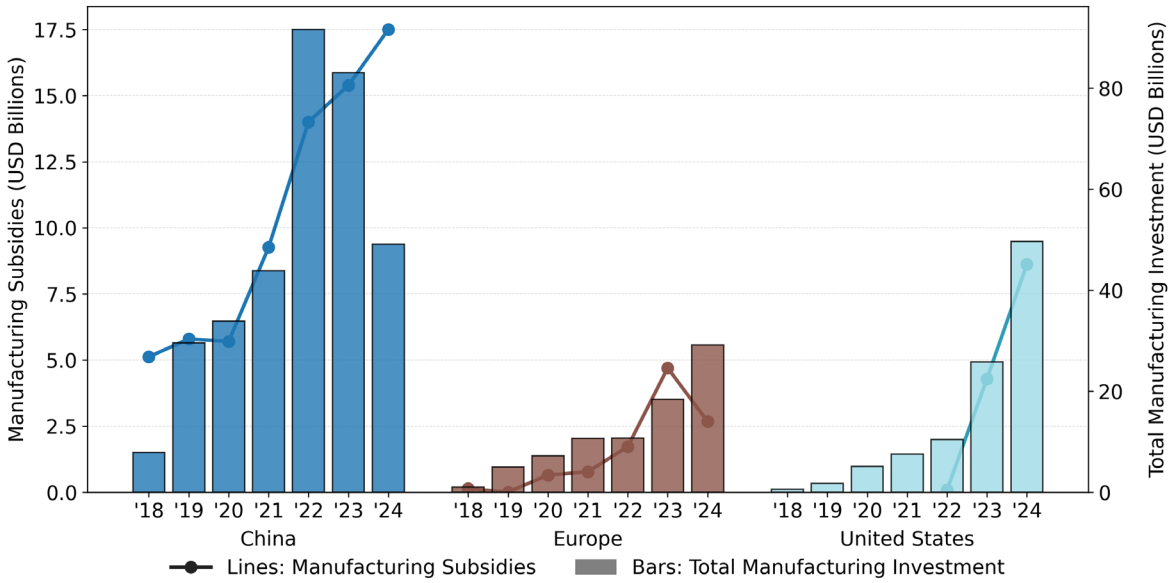

Figure 3. Annual Total Investment and Subsidies in EV and Battery Manufacturing by Region.
Note: Europe includes the 27 EU member states and the UK. Source: Global Clean Investment Monitor.

Europe consistently dedicated a dominant share of subsidies to EV uptake, while in the US and China, purchase incentives contributed declining shares of total support to their EV and battery sectors. Europe's EV purchase subsidies climbed steadily through 2023 and made up over 80 percent of total European EV and battery subsidies in each year from 2018-2024 (Figure 3). In the US, EV purchase subsidies grew from 2020-2024, but they fell to 54 percent of total US subsidies for EVs and batteries in 2024 as the US scaled up support for manufacturing. In China, EV purchase incentives grew from 2020-2023 but fell from 60 percent of related subsidies in 2018 to 49 percent in 2024.

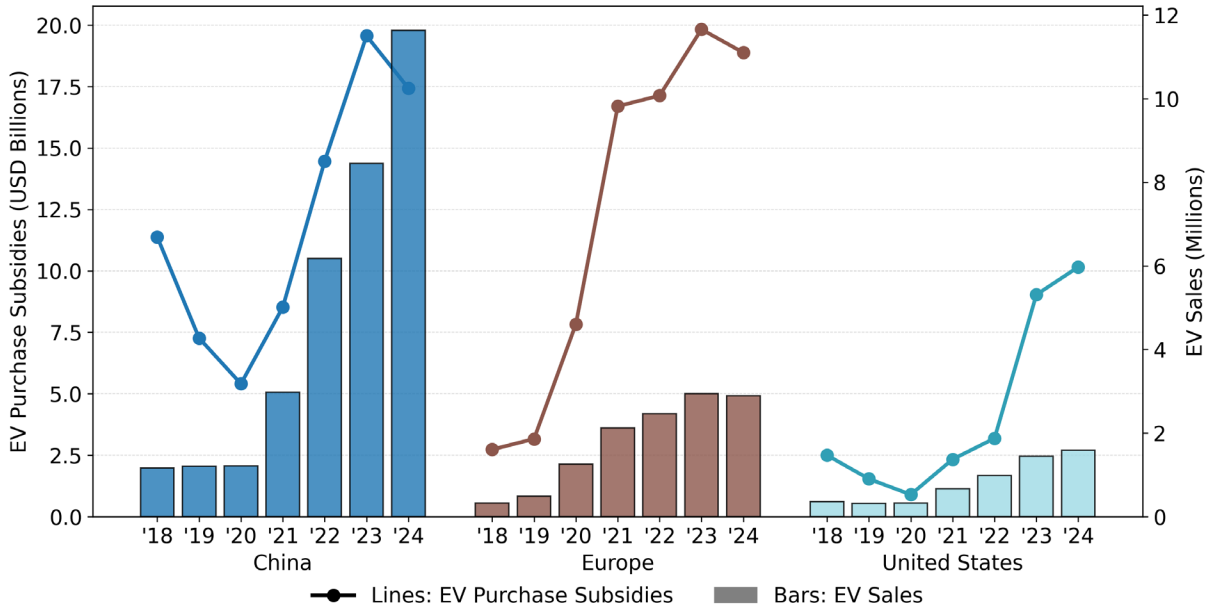

Figure 4. Annual EV Purchase Subsidies and Sales by Region.
Note: Europe includes the 27 EU member states and the UK.
Source: Global Clean Investment Monitor, EV Volumes.

China's EV sales increased ten-fold from 2018-2024, and purchase subsides that had been falling rebounded as sales spiked. In Europe, EV sales were nearly nine times higher in 2024 than in 2018 (Figure 4). As EV demand took hold and manufacturing costs fell, China scaled back generous grant-based purchase subsidies. However, it continued to offer purchase tax incentives, and as EV sales took off, related tax expenditures followed, causing a rebound in total purchase subsidies. Nonetheless, its average per-vehicle subsidy fell dramatically from $9,800 in 2018 to $1,500 in 2024.

In Europe, purchase subsidies and EV sales followed similar growth trajectories, increasing most rapidly from 2019 to 2021. In this period, several countries adopted new or supplemented existing EV purchase subsidies as part of their COVID-19 stimulus measures. EV sales and subsidies saw more modest growth in 2022 and 2023 and a slight decline in 2024, as certain major markets eliminated or scaled back grant-based support. Overall, EV sales grew by more than EV subsidies from 2018 to 2024, leading average per-vehicle subsidies to fall from approximately $8,500 in 2018 to $6,500 in 2024.

The US provided a tax credit to incentivize consumer EV uptake over the 2018-2022 period. However, under that version of the credit, once a manufacturer sold 200,000 eligible vehicles, the value of the credit available for its vehicles was reduced for one year and then eliminated. As a result, expenditures associated with the credit fell from 2018 to 2020, as some of the most popular vehicles at the time became ineligible for the credit. From 2020 to 2022, US EV purchase subsidies began to tick back up, as more manufacturers entered the US EV market, and they jumped in 2023, after the IRA enhanced the tax incentives for EV purchases. Relatedly, US per-vehicle subsidy fell from $6,900 in 2018 to $2,700 in 2020, but by 2024 the average per-vehicle subsidy ticked back up to $6,400 as subsidies grew post-IRA.

III. Cross-Region Comparison: Trade Policy

From 2018 to 2024, the volume of global trade in passenger battery electric vehicles (BEVs) and lithium-ion batteries increased substantially, as did US and European Union (EU) imports of both goods. To protect the competitiveness of their domestic industries, the US and EU complemented domestic subsidies with trade protections. However, each region has done so to varying degrees, with the US taking a more aggressive approach to imports from China, producing differing trade patterns and tariff levels in 2024.

The period covered by the analysis pre-dates the current US Administration's escalating trade conflict. US tariff rates are in flux with the various modifications and pauses adopted since April 2025 and comprehensive trade data is not yet available for 2025. However, current US tariff policy likely accentuates existing differences in the US and EU's policy approaches and reinforces trends over the 2018-2024 period.

It is important to note that China has also used trade policy to support its domestic battery and EV industries. In their more nascent stages, China relied heavily on market access restrictions, including local content requirements to preserve space for domestic firms. More recently, China has turned to varying export controls on key inputs to the battery value chain, including restrictions on the export of graphite and rare earth elements beginning in 2023 and restrictions on the export of technologies related to lithium extraction and processing and the production of certain types of cathode active materials in 2025.

The US and EU both increased tariffs on BEV imports from China, but EU imports of Chinese-made EVs still rose steeply from 2018 to 2024. At the beginning of 2018, the US tariff rate on BEVs from China stood at 2.5 percent. That rate increased to 27.5 percent shortly thereafter, and by the end of 2024, it rose to 102.5 percent. Escalating tariffs, coupled with localization conditions built into related IRA incentives effectively cut off Chinese BEVs from entering the US market. Even as the value of US BEV imports grew to over $23 billion in 2024, less than one percent came from China.

The EU presents a different picture. At the beginning of 2018, the EU tariff rate on BEVs from China was 10 percent. In 2023, the European Commission initiated an anti-subsidy investigation into Chinese BEVs, and in the second half of 2024, imposed tariffs ranging from 7.8 percent to 35.5 percent for different manufacturers, in addition to the standard 10 percent import duty. Even with the new tariffs, EU BEV imports surged to nearly $9 billion in 2024, and 55 percent came from China.

The continued influx of Chinese-made BEVs into the EU may, in part, be a function of its more measured approach to tariffs. Previous analysis by Rhodium Group, for example, suggests that Chinese automakers could maintain a price advantage, even with tariff levels higher than what the European Commission ultimately imposed.[6] Additionally, generous EV purchase subsidies in Europe have supported robust EV demand and do not tend to include local content requirements.

All told, because the EU continued to import BEVs from China while US policy has effectively barred their import, the estimated weighted average tariff rate of BEV imports to the EU was substantially higher than that of the US in 2024 at roughly 20 percent compared to 1.2 percent in the US (Figure 5).

6 Sebastian, Gregor, Barkin, Noah, and Kratz, Agatha. (2024). Ain't No Duty High Enough. *Rhodium Group*. https://rhg.com/research/aint-no-duty-high-enough/.

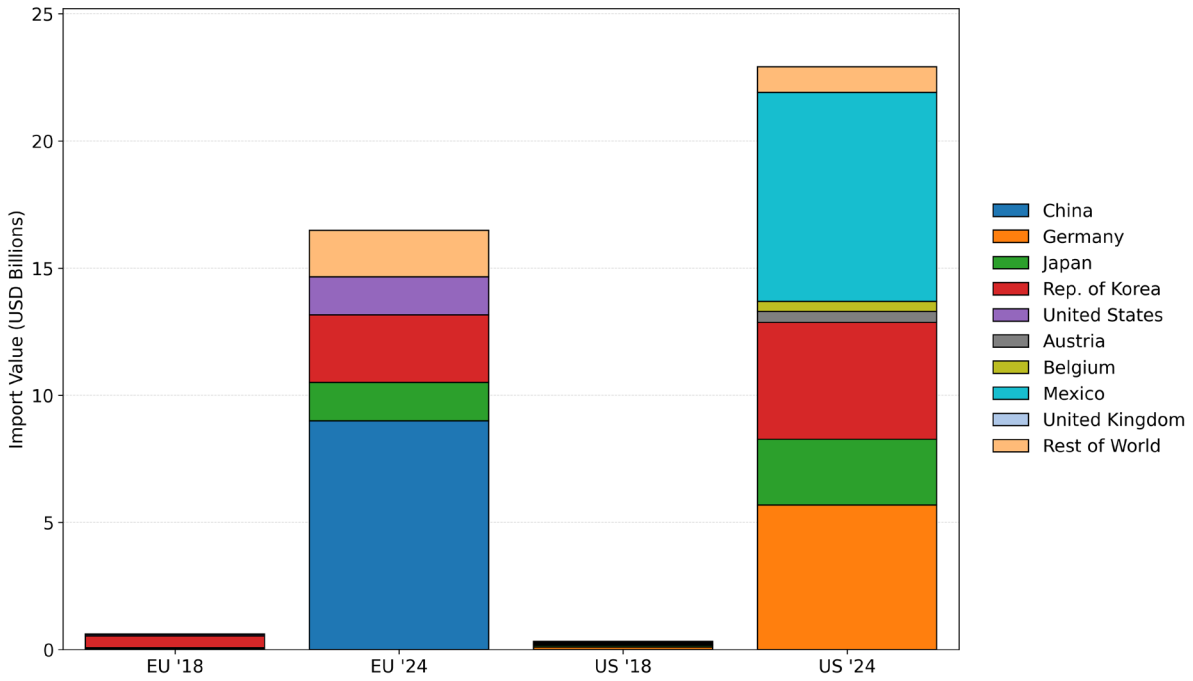

Figure 5. Battery EV Imports in the United States and European Union in 2018 and 2024.
Source: Global Clean Investment Monitor, MIT CEEPR using data from UN Comtrade.

The US also ramped up tariff rates on Chinese batteries over the same period, but battery imports—led by imports from China—surged in both the US and EU. US imports of lithium-ion batteries grew from $3.2 billion in 2018 to $23.8 billion in 2024. Over that period, the US ratcheted its tariff rate on Chinese battery imports from 3.4 percent in 2018 to 28.4 percent by the end of 2024. However, even with the higher rate, Chinese battery imports still grew by over 10 times compared to 2018 and made-up 69 percent of all US imports in 2024. By contrast, the EU maintained a 2.7 percent tariff rate over the 2018-2024 period, and in 2024, China produced 86 percent of batteries imported by the EU. On net, the US weighted average tariff rate on batteries rose over 6 percentage points between 2018 and 2024, whereas the EU rate rose by less than a percentage point over the same period (Figure 6).

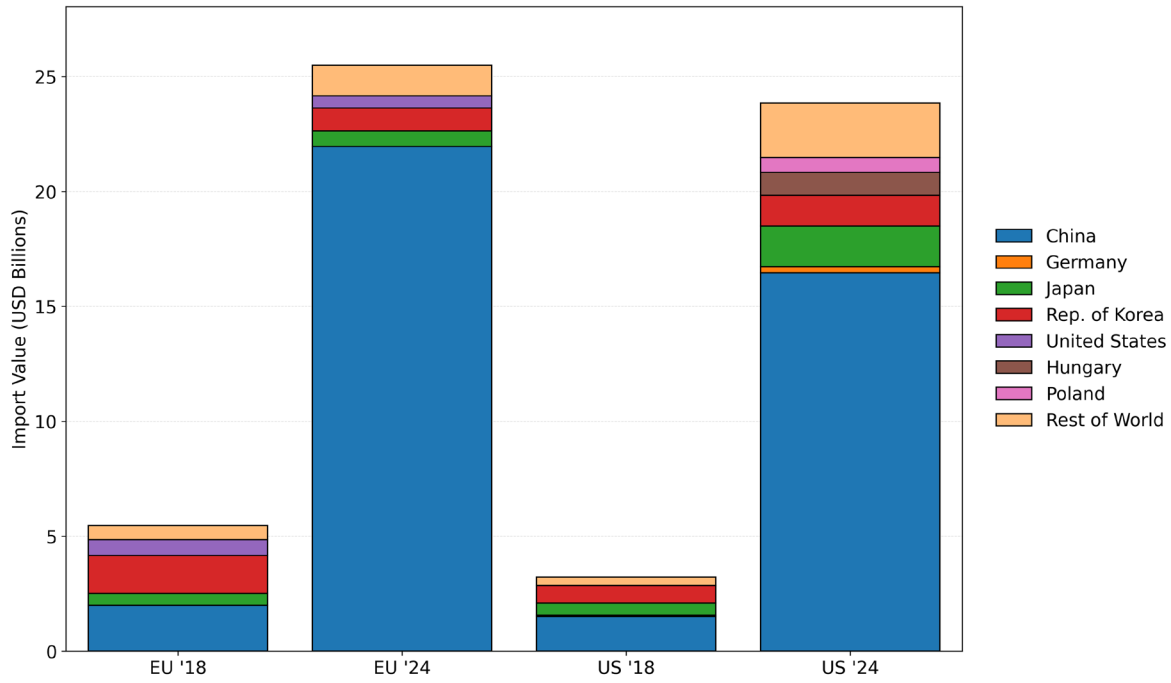

Figure 6. Battery Imports in the United States and European Union in 2018 and 2024.
Source: Global Clean Investment Monitor, MIT CEEPR using data from UN Comtrade.

IV. Chinese Subsidies

Policy support plays a critical role in fostering domestic markets and growing export industries in various clean energy technologies in China, and EVs and batteries have been a core focus of China's overall industrial policy. The government has sustained support for EVs and batteries in varying forms for decades, including subsidies supporting research and development, large-scale public procurement, consumer purchase subsidies, direct grants to manufacturers, and various tax incentives. China identified EVs as a priority technology for research and development in 2001 and began to roll out EV purchase subsidies for consumers and national support for charging infrastructure installation in 2009. This analysis covers the 2018-2024 period, and although Chinese firms now dominate global markets across the value chain, China continues to subsidize these industries at scale.

China scaled up subsidies for EV and battery production from 2018-2024. Total EV and battery manufacturing subsidies grew from just over $5 billion in 2018 to $17.5 billion in 2024 (Figure 7). Most (65 percent of the 2018-2024 total) supported EV manufacturing, but battery manufacturing subsidies grew faster than support for EV production and contributed to a steadily rising share of annual subsidies, reaching 42 percent in 2024.

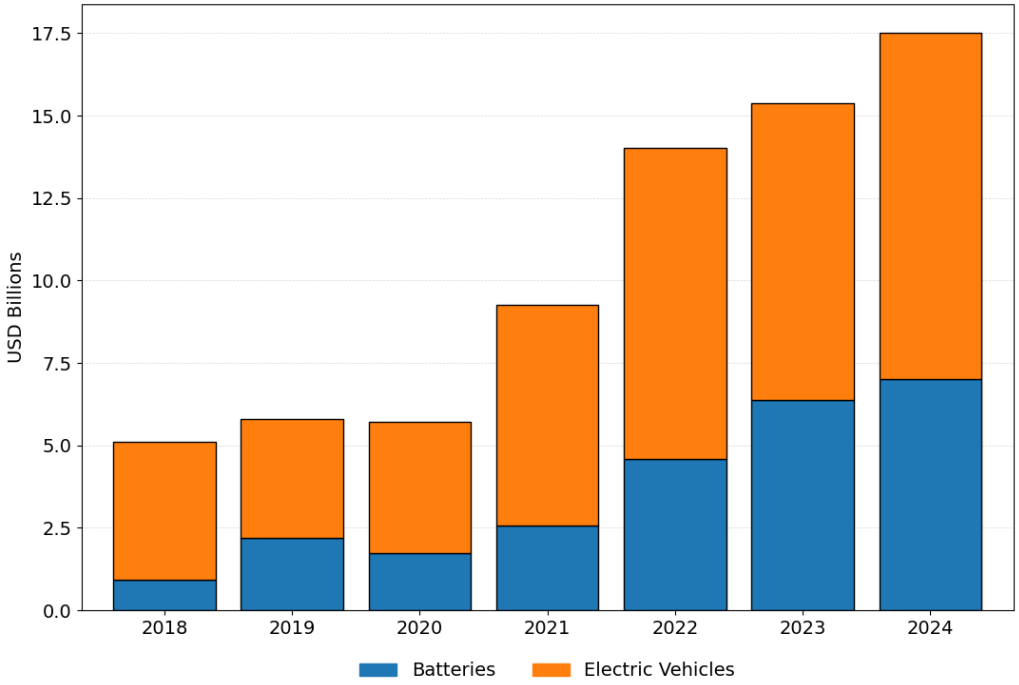

Figure 7. Annual Chinese Manufacturing Subsidies by Technology.
Source: Global Clean Investment Monitor.

China deployed a diverse mix of instruments to support EV and battery manufacturing, but the composition of its manufacturing subsidies has shifted over time. Specifically, as a share of total EV and battery manufacturing support, tax incentives steadily declined, while below-market equity benefits grew (Figure 8). Rising below-market equity returns primarily benefited EV manufacturers. China's EV manufacturing segment includes not only leading firms with operations dedicated to EVs but also large state-owned automakers that are transitioning from predominantly internal combustion engine (ICE) vehicles to EV manufacturing. These state-backed players have experienced poor profits for several years as domestic demand has shifted from ICE vehicles towards EVs. As a result, many are operating at a loss while government-backed shareholders remain invested.

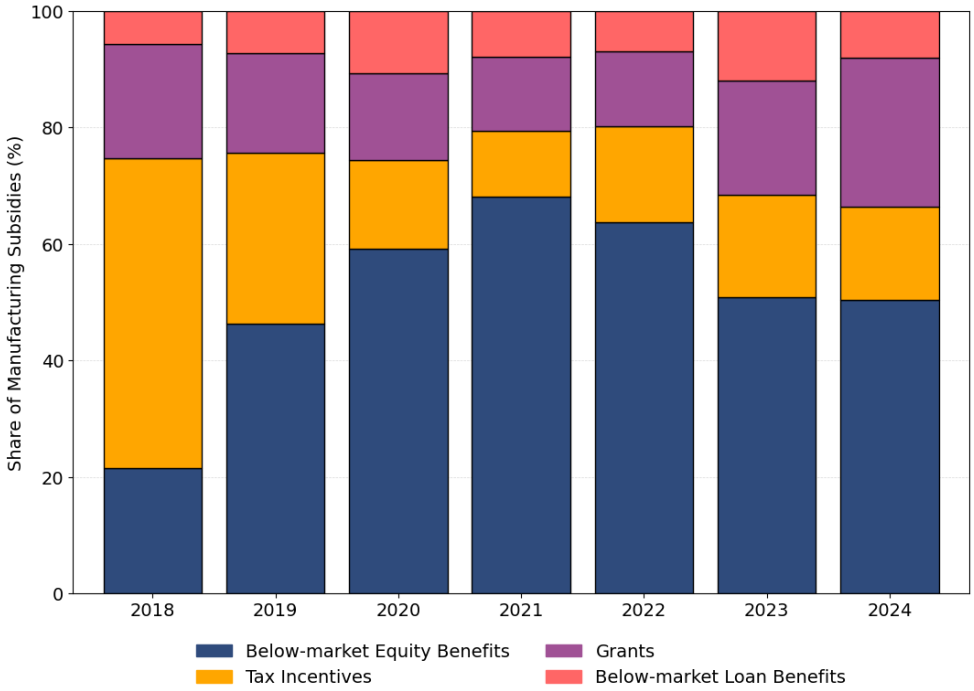

Figure 8. Annual Share of Chinese Manufacturing Subsidies by Subsidy Instrument.
Source: Global Clean Investment Monitor.

Leading firms account for an outsized portion of battery manufacturing subsidies. CATL was the top recipient of grants and tax incentives among all firms evaluated, receiving nearly $1.3 billion in grants and $0.8 billion in tax incentives in 2024 alone. Tax benefits to battery manufacturers have grown in recent years. Firms in the covered segments often benefit from value-added tax refunds and preferential corporate income tax (CIT) rates, with the largest benefits associated with preferential CIT rates. Firms that receive the designation "High and New Technology Enterprise" are eligible for a reduced 15 percent CIT rated compared to the standard 25 percent rate. Because the benefit is directly linked to a firm's income, as firms grow, tax benefits grow in tandem. China's top battery cell manufacturers have seen their revenues accelerate in recent years. For example, CATL's net profits grew from around $3.0 billion to $5.1 billion from 2021 to 2022, and as a result, its estimated benefits from the preferential CIT rate grew from $0.3 billion to $0.6 billion.

Manufacturing subsidies relative to total investment have grown over time. From 2018 to 2022, total investment in EV and battery manufacturing surged along with rising subsidies to those segments (Figure 9). Over this period, total manufacturing investment was roughly five times larger on average than subsidies. In 2023 and 2024, subsidies continued to rise, but private investment in both EV and battery manufacturing fell sharply amid significant overcapacity in EV and battery manufacturing. As a result, 2024 total investment was only three times greater than subsidies for combined EV and battery manufacturing.

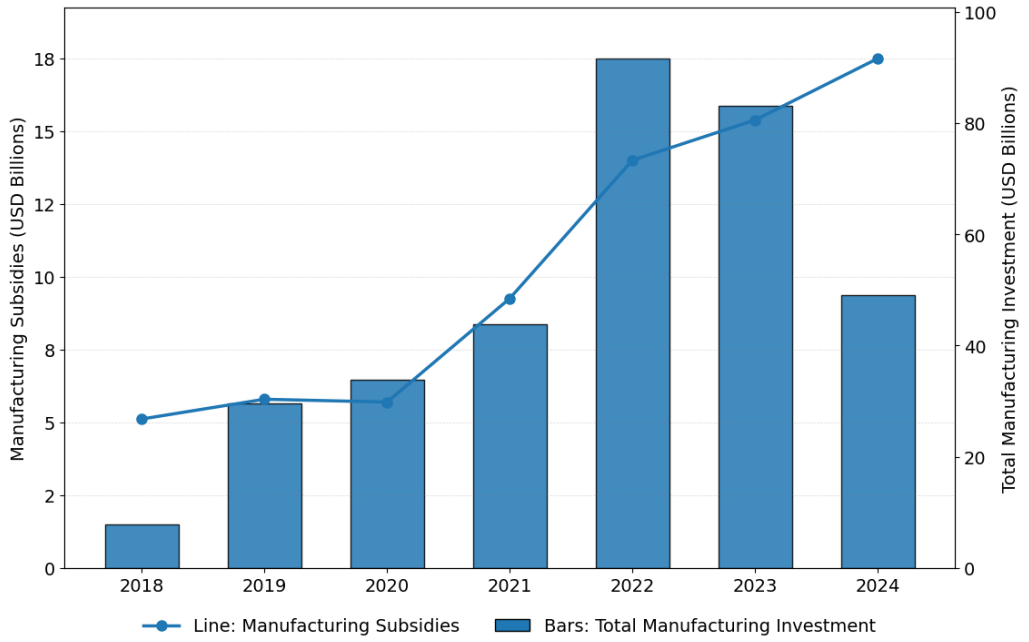

Figure 9. Chinese Annual Total Investment and Subsidies in EV and Battery Manufacturing.
Source: Global Clean Investment Monitor.

Total EV purchase subsidies increased from $11 billion in 2018 to $17 billion in 2024, largely driven by rising expenditures associated with EV tax incentives as the EV fleet has grown. China first introduced grant-based EV purchase subsidies in the form of purchase rebates in 2009, but as EV demand took hold and manufacturing costs fell, the government began limiting grant-based purchase subsidies in 2014 by incrementally reducing per-vehicle benefits and raising the threshold for qualifying vehicles. While Central government purchase grants officially ended in December 2022, pay outs continued beyond that date for subsidies earned by automakers in previous years. Additionally, in 2024, China announced a new grant-based auto trade-in scheme. Overall, grant-based purchase subsidies have fallen substantially, from $8 billion in 2018 to $2.8 billion in 2024. In addition to grant-based subsidies, China has exempted EVs from car ownership taxes since 2012, and in 2014, it introduced a sales tax exemption, which has been extended with adjustments several times. From 2018-2024, expenditures associated with EV tax breaks increased nearly five-fold to $14.6 billion (Figure 10).

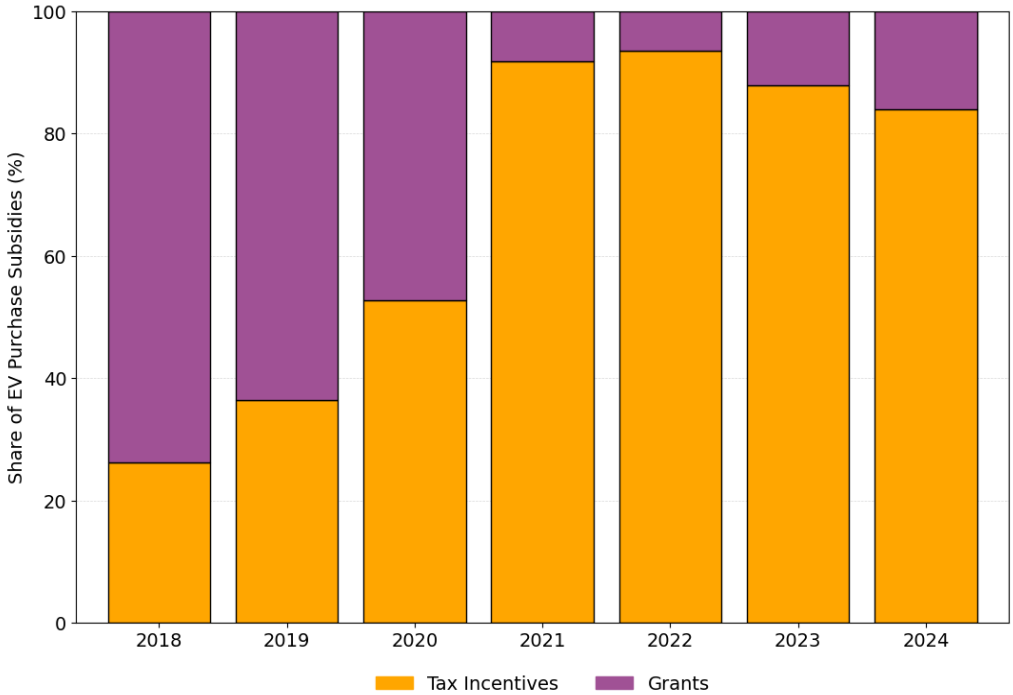

Figure 10. Annual Share of Chinese EV Purchase Subsidies by Subsidy Instrument.
Source: Global Clean Investment Monitor.

V. United States Subsidies

Between 2018 and 2022, the US offered a consumer EV tax credit, along with additional grant-based support for EV uptake. While some early support for EV manufacturing took place before 2018, in the covered period, supply-side subsidies predominantly focused on early-stage innovation rather than deployment.

In 2022, the IRA created new and enhanced existing tax credits that contributed to a rapid escalation of US EV and battery subsidies beginning in 2023. The IRA's Advanced Manufacturing Production Credit (45X) provides a per-unit tax credit to companies that manufacture components of clean energy technologies in the US, including battery components, and its Qualified Commercial Clean Vehicles Credit (45W) provides a per-vehicle tax credit for companies that purchase EVs for commercial use. The IRA also expanded the existing New Clean Vehicle Credit (30D), which provides a per-vehicle tax credit for individuals who purchase EVs for personal use.

Public support for battery manufacturing jumped with the establishment of the Advanced Manufacturing Production Credit, increasing from around $90 million in 2022 to $8.6 billion in 2024. In that period, battery manufacturing subsidies totaled $13 billion and contributed more than one-third of US EV and battery subsidies. Over 90 percent of battery manufacturing subsidies came from the 45X tax credit, but US battery production also benefited from several smaller grant programs and low-interest loans. Those grants and loans made up the entirety of the $90 million worth of subsidies provided in 2022 and totaled $987 million from 2022-2024. EV manufacturing is not eligible for 45X. Far more limited US subsidies for EV manufacturing activities came from selected grant programs and individual below-market loans.

Total investment in battery manufacturing surged with subsidies (Figure 10). In 2023, total battery manufacturing investment in the US increased by 220 percent, the largest year-on-year growth in the 2018-2024 period. In 2023 and 2024, total investment in battery manufacturing was nearly six times larger than subsidies over the same period.

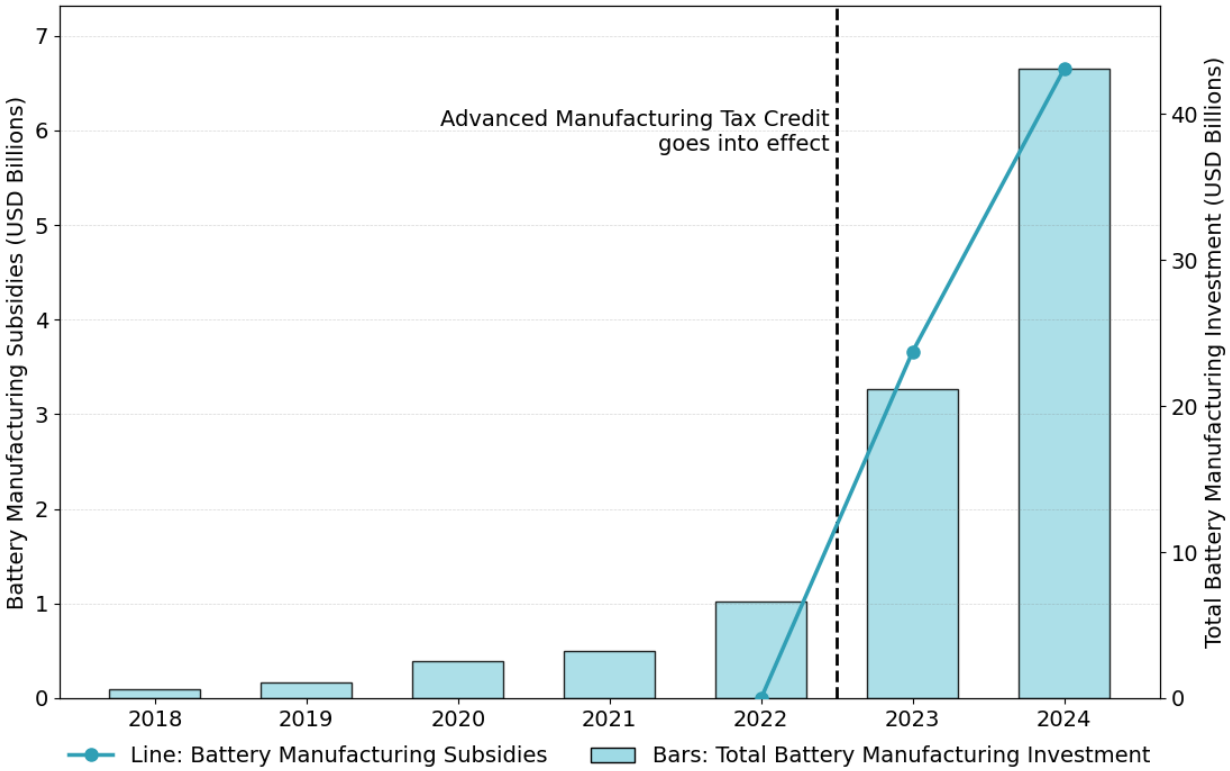

Figure 11. United States Annual Total Investment and Subsidies in Battery Manufacturing.
Source: Global Clean Investment Monitor.

70 percent of all US EV and battery subsidies supported EV demand. From 2018 to 2024, EV purchase subsidies totaled $29.6 billion. Over half of that support (55 percent) came from the 30D consumer tax credit. Between 2018 and 2022, before the expanded version of 30D came into effect, average 30D tax credits totaled $1.8 billion per year. In 2023 and 2024, that amount jumped to $3.7 billion per year. The IRA also introduced a new commercial purchase tax incentive, which contributed another 39 percent of purchase subsidies.[7] Most of the remaining 6 percent of purchase subsidies came from grants for local governments to purchase electric buses.

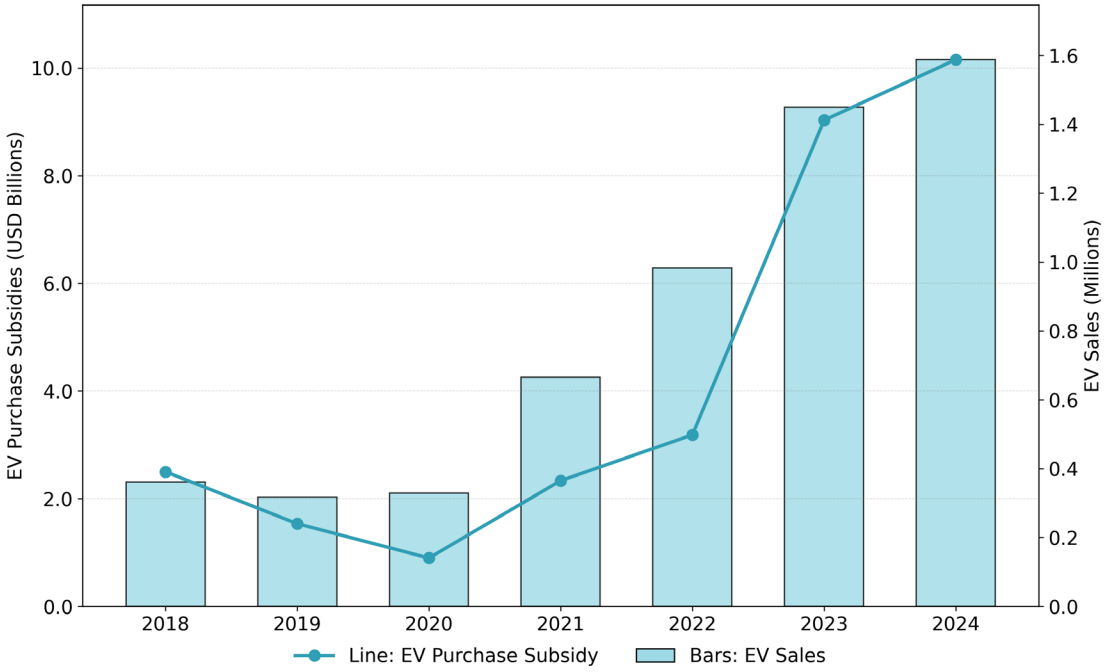

Figure 12. Annual United States Electric Vehicle Purchase Subsidies and Sales.
Source: Global Clean Investment Monitor, EV Volumes.

VI. European Subsidies

Europe has consistently used policy, including regulatory mandates, escalating vehicle emissions standards, and public subsidies, to cultivate domestic EV markets. Over the 2018-2024 period, subsidies for EVs and batteries came primarily from national budgets. Many major European economies adopted EV purchase subsidies in the 2010s and maintained some form of support for EV uptake through 2024, for example. However, the EU budget has also supported EV and battery subsidies—including grant-based support and guarantees to subsidize related investments by public financial institutions.

From 2018 to 2024, European EV and battery subsidies focused almost entirely on demand-side stimulus, with 89 percent of total EV and battery subsidies supporting EV purchase. European countries relied on a mix of grants and tax incentives to boost EV sales. Grant-based purchase subsidies peaked in 2021 and then declined through 2024, as some major economies scaled back support. By contrast, tax-based incentives, including registration, ownership, and company car tax benefits, rose steadily between 2018 and 2024, accounting for 74 percent of all purchase subsidies in 2024 compared to just 45 percent in 2018 (Figure 13). While some countries introduced new tax incentives or made existing incentives more favorable to EVs, the rising overall expenditure associated with EV tax benefits is largely attributable to the growing size of EV fleets in selected countries. Estimated UK tax benefits, for example, accounted for over 40 percent of all European EV purchase subsidies in 2024.

7 Because of data limitations, we exclude any costs of the used clean vehicle credit that was also created by the IRA and provides a tax credit worth 30 percent of the sale price of qualifying used EVs up to a maximum benefit of $4,000. Until recently, used EVs made up a very small share of the overall EV market, but in 2024 began to make up a growing share of the total market. (In December of 2024 Cox Automotive estimated that used sales made up 22 percent of total EVs sales.) However, because the IRA created that tax credit the trends noted are not altered by its exclusion.

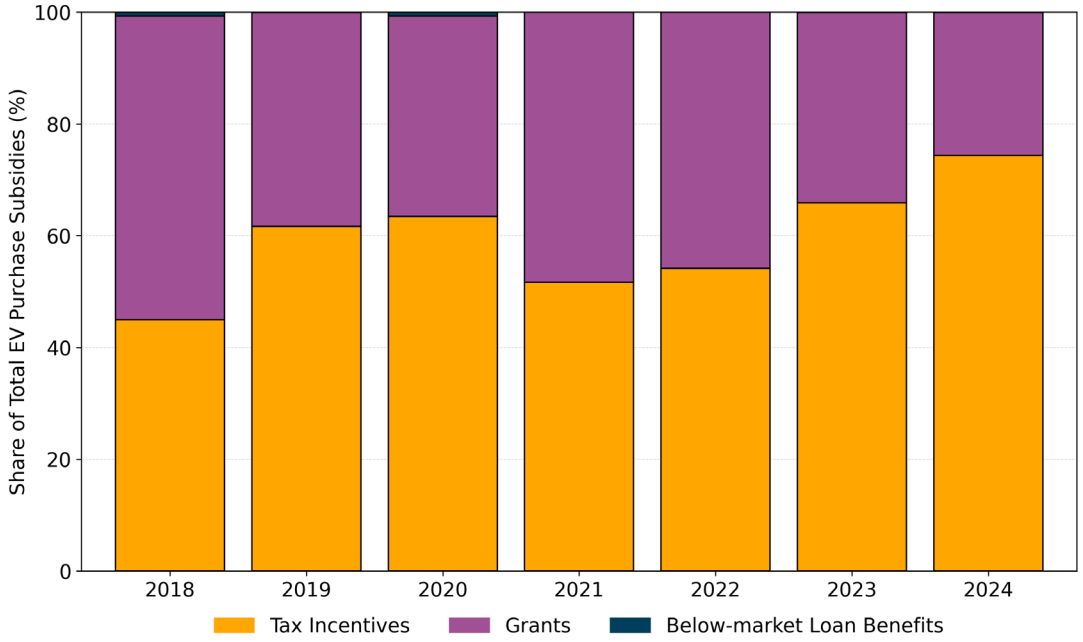

Figure 13. Annual Share of European EV Purchase Subsides by Instrument.
Note: Europe includes the 27 member states and the UK. Source: Global Clean Investment Monitor.

Germany, the United Kingdom, and France collectively account for 60 percent of all EV sales from 2018-2024. All three subsidized EV uptake but with differing approaches. Germany's support has primarily been grant-based and has fluctuated over time. Notably, Germany's support fell steeply between 2021 and 2024, as budget constraints made maintaining large-scale grants more challenging. In France, which also relied on grant-based support, total EV purchase subsidies rose gradually from 2018-2024, even as it tightened eligibility requirements for its main grant program. In contrast, the UK phased out grants and primarily used generous tax incentives to subsidize the price of EVs, and its total EV purchase subsidies ballooned over the period as annual sales increased.

Germany's fluctuating support has tracked closely with annual EV sales. France and the UK saw comparable EV sales, despite per-vehicle UK purchase subsides being roughly three times those of France on average (Figure 14). France maintained the lowest per-vehicle subsidy, averaging at just over $4,000 per vehicle. Germany's per-vehicle subsidy fell in the middle with an average of just over $5,000 per vehicle. While the UK maintained the highest subsidy, averaging over $14,000 per vehicle. Europe-wide, the average per-EV subsidy was approximately $6,800.

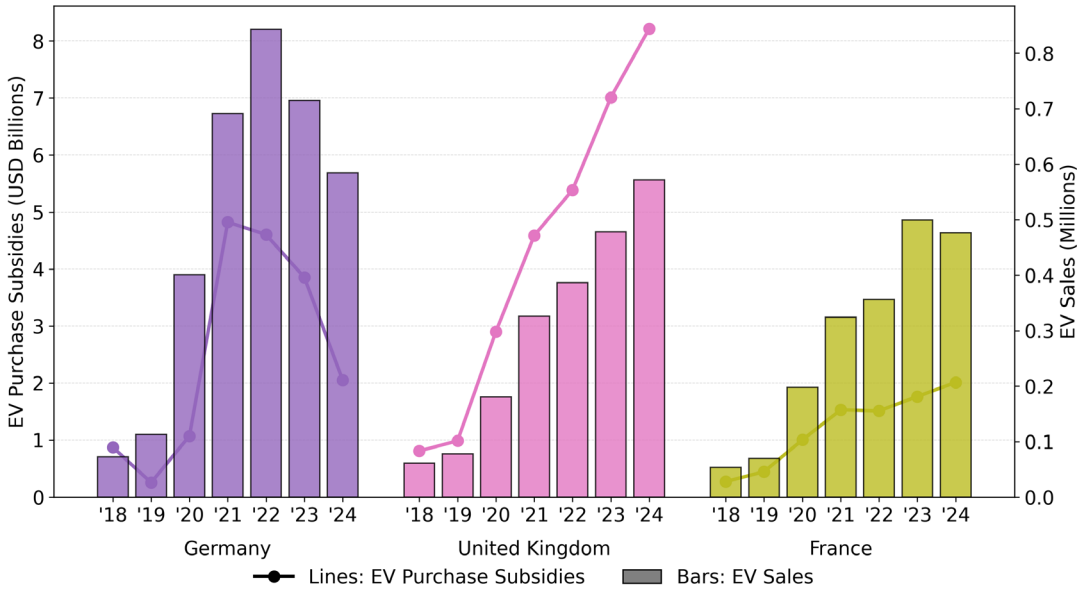

Figure 14. Annual EV Purchase Subsidies and Sales for Select European Countries.
Source: Global Clean Investment Monitor, EV Volumes.

Subsidies for EV and battery manufacturing have been smaller in scale and more sporadic. Just 11 percent of European subsidies from 2018-2024 supported EV and battery production. Three-quarters of that funding supported battery manufacturing, and 95 percent of manufacturing support came in the form of grants, with the balance coming from below-market loans. While annual manufacturing subsidies have generally increased since 2018, they have fluctuated from one year to the next, likely reflecting the lumpy nature of manufacturing investments.

As with EV purchase subsidies, most manufacturing support has been concentrated in a small number of European countries. However, subsidy patterns do not follow as closely with economy size, with some smaller European countries meaningfully contributing to total subsidies (Figure 15). Particularly, Hungary and the Slovak Republic—whose GDPs rank 18 and 19, respectively, of the 28 included European countries—had the fourth and seventh largest subsidies in EV and battery manufacturing over the entire period.

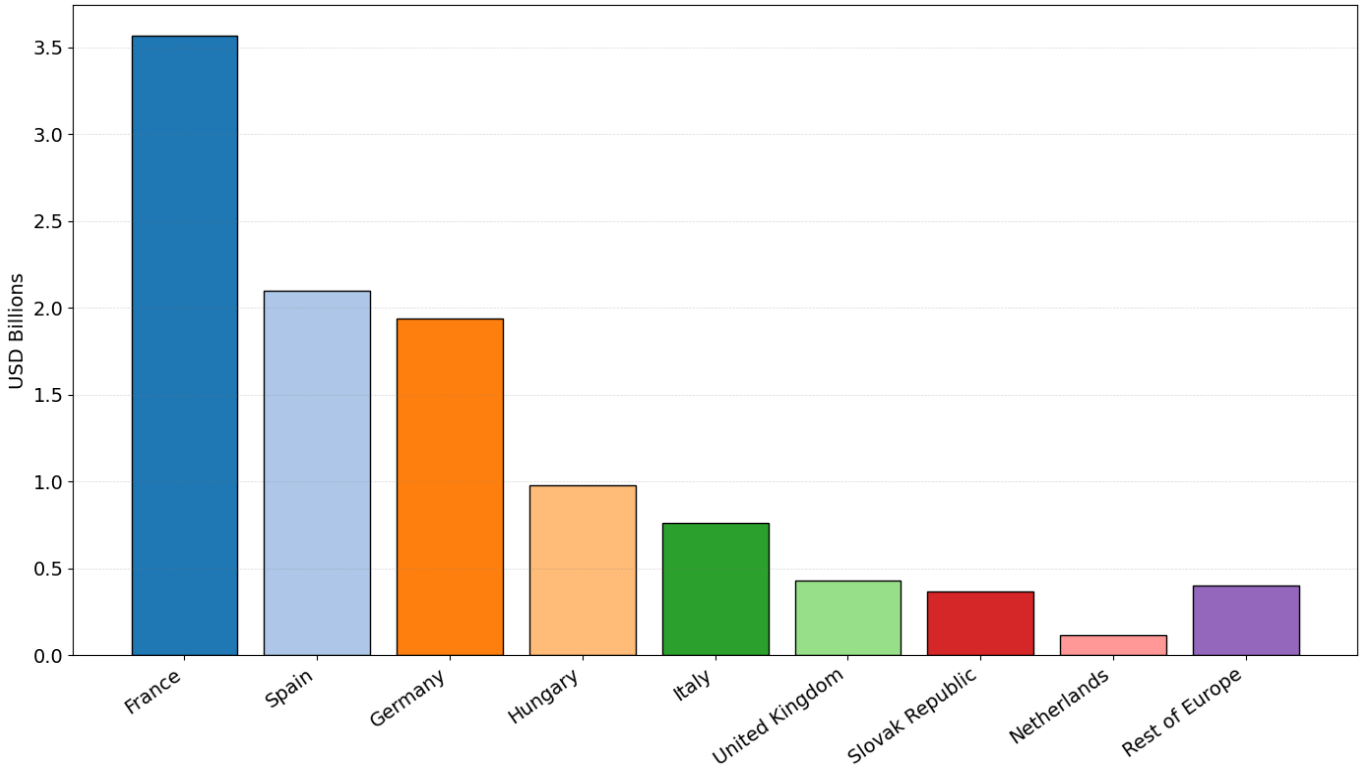

Figure 15. Total EV and Battery Manufacturing Subsidies for Select European Countries over the 2018-2024 Period.
Source: Global Clean Investment Monitor.

VII. Acknowledgements

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Appendix: Data and Methodology

This analysis covers China, Europe (defined as the 27 EU member states and the UK), and the United States and incorporates data on subsidies supporting the manufacturing and deployment of EVs (battery electric vehicles and plug-in hybrid electric vehicles) and batteries. All amounts are recorded in real US dollars with a base year of 2023. Funding levels reported or estimated in local currencies are converted to nominal US dollars using average annual exchange rates published by the International Monetary Fund.[8] Those nominal dollars are then adjusted for inflation using deflators sourced from the Bureau of Economic Analysis.

Wherever possible, the data reflects funds committed to relevant programs or entities rather than announced or appropriated amounts. In-scope public expenditures are:

1. Grants: any direct cash payments from a government to a third party
2. Below-market loans: any financial assistance with terms that include some form of subsidized repayment scheme
3. Tax incentives: all forms of preferential tax treatment provided to taxed entities
4. Below-market equity: investments made by a public entity into companies on terms preferential to those that a commercial entity would be willing to make

Europe

Subsidies data include funding committed by state governments and the European Union and primarily come from official budget documentation published on government websites or provided directly by government officials when public documentation did not exist.[9] The analysis is based on public expenditures committed to in-scope programs or investments from 2018-2024. To determine the proportion of programs that are in scope, the government's own funding breakdowns are used where available, and reasoned estimates are applied when not available.

Where government data is not available on the total cost of EV-related tax incentives, we estimate those costs using annual country-level data on EV registrations and the estimated per-vehicle difference in taxes levied on an average EV and commensurate internal combustion engine vehicle.[10] Per-vehicle tax differences for 2018-2022 draw on analysis underlying the article *Electrifying company cars? The effects of incentives and tax benefits on electric vehicle sales in 31 European countries*, and we estimated per-vehicle differences for 2023-2024 using the methodology set out in that article.[11]

China

Estimates combine bottom-up (recipient financial disclosures) and top-down (government reporting on subsidy

8 Exchange Rates. International Monetary Fund. https://data.imf.org/en/Data-Explorer?datasetUrn=IMF.STA:ER(4.0.1)

9 In some cases, budget documentation was not sufficiently granular, and data instead came from official government databases. Because the data seeks to capture actual funding committed as opposed to announced funding, the data include amounts committed by State governments for programming set out in national Recovery and Resilience Plans, and this funding is recorded as a "State" commitment, even though those expenditures may ultimately be covered (in whole or in part) by a EU Recovery and Resilience Facility payment.

10 EV fleet statistics for European Union member states are from the European Alternative Fuels Observatory and supplemented with information published at the government level as necessary. For the UK, fleet statistics are from their comprehensive vehicle statistics database for the years 2018-2023. As of the publishing of this report, that database had not yet been updated to include the entirety of 2024. To adjust for the total EV fleets, new registrations are extrapolated using a combination of recent trends and data available from the European Alternative Fuels Observatory.

11 Schub, Hendrik, Plötz Patrick, and Sprei, Frances. (2025). Electrifying Company Cars? The Effects of Incentives and Tax Benefits on Electric Vehicle Sales in 31 European Countries. *Energy Research and Social Science*. https://doi.org/10.1016/j.erss.2024.103914.

expenditures) approaches, correcting for overlap, to achieve a more complete picture of state support. Data on the value of purchase incentives is sourced from government reporting. Data on manufacturing subsidies was gathered from the financial disclosures of listed firms accounting for 70-90 percent of the industry's market share. Subsidies to the remaining portion of the market are estimated based on the scale of subsidies of the covered sample.

Government grants are directly reported as a distinct line item in firm financial disclosures and include grant funding from any jurisdiction's government. However, as most Chinese firms in the covered industries locate the vast majority of production capacity within China, support from other jurisdictions is limited in scale and so any overlap with estimates of support for the US and EU are minimal. Financial disclosures sometimes directly state the value of benefits received through government tax incentives and sometimes provide a preferential rate without disaggregating income from the benefit that the firm received, as is the case for China's value-added tax incentive offered to Advanced Manufacturing Enterprises. Declared tax incentives from the firm's financial disclosures are taken directly as reported and aggregated with benefits from other preferential rates. Benefits from preferential rates are estimated using other line items in the firm's financial report.

The methodology estimates benefits received from below-market loans by comparing reported interest rates to benchmark rates similar firms in other jurisdictions would likely receive. The difference in expected and actual interest payments represents the value of benefits received.

Data on below-market equity seeks to capture the ongoing benefits firms receive from government-backed equity participation through the observed post-investment financial performance of firms with government-backed investors. The method identifies firms with substantial government-backed shareholding and compares their actual returns on capital to returns expected for companies operating in the same sector globally. If the firm has not generated adequate returns to cover the estimated cost of capital at the global benchmark rate, it is possible that government-backed investors are accepting below-market returns. The difference in the expected and actual returns is the value attributed as below-market benefits.

United States

Data on US public expenditures committed for in-scope subsidies is largely from the US Clean Investment Monitor (CIM). A detailed methodology document is available on the CIM website.[12] Because the US CIM's subsidies data only includes the period of 2022-2024, this report supplements data published by the US CIM with a direct estimate of the electric vehicle tax credit (30D) that existed over the 2018-2021 period using the same method as is used for the US CIM, but accounting for cumulative sales by manufacturer to determine the manufacturer-specific credit phase-out in the electric vehicle tax credit that was in place before the passage of the IRA.

Tariffs and Trade

Referenced US tariff rates are from the US International Trade Commission's Harmonized Tariff Schedule and the US Trade Representative's 301 Tariff Investigation Actions tool.[13] Referenced EU tariff rates are from the Integrated Tariff of the European Union database.[14] Data on the value of trade flows is from UN Comtrade.[15] The HS codes 870380 and 850760 were used for battery electric vehicles and batteries, respectively.

12 The Clean Investment Monitor. Rhodium Group-MIT CEEPR. https://www.cleaninvestmentmonitor.org/.

13 Harmonized Tariff Schedule. U.S. International Trade Commission. https://hts.usitc.gov.

14 Integrated Tariff of the European Union. European Commission. https://taxation-customs.ec.europa.eu/customs/calculation-customs-duties/customs-tariff/eu-customs-tariff-taric_en.

15 Trade Data. UN Comtrade Database. https://comtradeplus.un.org/TradeFlow.

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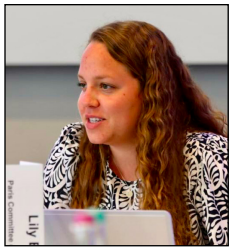

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